

Exam. Code : 206702

Subject Code : 4722

M.Sc. Computer Science 2nd Semester (Batch 2021-23)

MCS-201 : THEORY OF COMPUTATION

Time Allowed—3 Hours] [Maximum Marks—100

Note :— Attempt *five* questions in all, selecting at least *one* question from each section. The **fifth** question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. What are the closure properties of regular languages ? Explain using suitable examples. 20
2. (a) Let L be the set of all Palindromes over {a, b}, construct a grammar G generating L. 10
(b) Explain the steps to show that the Context Free Grammars are closed under concatenation. 10

SECTION—B

3. Define Pushdown Automation. Design a PDA for the following language :
$$L = \{0^n 1^n : n \text{ is any positive integer}\}. \quad 20$$
4. What are the guidelines of designing a Turing Machine ? Design a Turing Machine M to recognize the language $\{1^n 2^n 3^n | n \geq 1\}$. 20

SECTION—C

5. What is meant by Syntax Analysis ? What is the role of theory of computations in it ? Explain with the help of suitable example. 20
6. Describe the properties of LR(k) grammars which are useful for parsing and other applications. 20

SECTION—D

7. Define rewriting system in TOC. How one can design it ? Explain. 20
8. Write short notes on :
 - (a) Algebraic properties
 - (b) Context sensitivity. $2 \times 10 = 20$